

Claims

1. A motion compensation device comprising:

motion vector detection means for detecting a motion vector between a detection pixel of a current field and a detection pixel of a reference field, from image information of the current field in a video signal obtained by performing double-speed conversion on a video signal and image information of the reference field that is one frame later than the current field;

image shifting means for shifting the detection pixel of the current field by $1/2$ of the motion vector and shifting the detection pixel of the reference field by $-1/2$ of the motion vector; and

averaging means for performing motion compensation on the video signal of the current field by weighting and combining pixel data of the detection pixel of the current field and pixel data of the detection pixel of the reference field shifted by the image shifting means.

2. The motion compensation device according to claim 1, wherein the averaging means performs weighting inversely proportional to a shift amount by the image shifting means and combining on the detection pixels.

3. The motion compensation device according to claim 1, wherein

the motion vector detection means detects the motion vector with a block matching method for every block comprising a prescribed number of pixels.

4. A motion compensation device, comprising:

motion vector detection means for detecting a motion vector between a detection pixel of a current field and a detection pixel of a reference field, from image information of the current field in a video signal obtained by performing telecine conversion and double-speed conversion on a film and image information of the reference field in a reference signal obtained by delaying the video signal by two frames;

image shifting means for shifting detection pixels of three fields following the current field in the video signal by $1/4$, $2/4$, and $3/4$ of the motion vector, respectively, and shifting detection pixels of three fields following the reference field in the reference video signal by $-3/4$, $-2/4$, and $-1/4$ of the motion vector, respectively; and

averaging means for performing motion compensation on the video signal of the three fields following the current field by weighting and combining pixel data of the detection pixels of the three fields following the current field and pixel data of the detection pixels of the three fields following the reference field shifted by the image shifting means.

5. The motion compensation device according to claim 4, wherein the averaging means performs weighted average inversely proportional to a shift amount by the image shifting means, on each of the detection pixels.

6. The motion compensation device according to claim 4, wherein the motion vector detection means detects the motion vector with a block matching method for every block comprising a prescribed number of pixels.

7. A motion compensation method comprising:

a motion vector detection step of detecting a motion vector between a detection pixel of a current field and a detection pixel of a reference field, from image information of the current field in a video signal obtained by performing double-speed conversion on a video signal and image information of the reference field that is one frame later than the current field;

an image shifting step of shifting the detection pixel of the current field by $1/2$ of the motion vector and shifting the detection pixel of the reference field by $-1/2$ of the motion vector; and

an averaging step of performing motion compensation on the video signal of the current field by weighting and combining pixel data of the detection pixel of the current field and pixel data of the detection pixel of the reference field shifted by the image

shifting means.

8. The motion compensation method according to claim 7, wherein, in the averaging step, weighted average inversely proportional to a shift amount in the image shifting step is performed on each of the detection pixels.

9. The motion compensation method according to claim 7, wherein, in the motion vector detection step, the motion vector is detected with a block matching method for every block comprising a prescribed number of pixels.

10. A motion compensation method comprising:

a motion vector detection step of detecting a motion vector between a detection pixel of a current field and a detection pixel of a reference field, from image information of the current field in a video signal obtained by performing telecine conversion and double-speed conversion on a film and image information of the reference field obtained by delaying the video signal by two frames;

an image shifting step of shifting detection pixels of three fields following the current field in the video signal by $1/4$, $2/4$, and $3/4$ of the motion vector, respectively, and shifting detection pixels of three fields following the reference field in the reference video signal by $-3/4$, $-2/4$, and $-1/4$ of the motion

vector, respectively; and

an averaging step of performing motion compensation on the video signal of the three fields following the current field by weighting and combining pixel data of the detection pixels of the three fields following the current field and pixel data of the detection pixels of the three fields following the reference field shifted by the image shifting means.

11. The motion compensation method according to claim 10, wherein,

in the averaging step, weighted average inversely proportional to a shift amount by the image shifting means is performed on each of the detection pixels.

12. The motion compensation method according to claim 10, wherein,

in the motion vector detection step, the motion vector is detected with a block matching method for every block comprising a prescribed number of pixels.

13. A motion compensation device for performing motion compensation on an N-time-speed video signal subjected to N-time-speed conversion by inserting N-1 pieces of interpolation screens created from an original screen of a video signal between the original screen and a next original screen, the motion

compensation device comprising:

motion vector detection means for detecting a motion vector between a detection pixel of the original screen and a detection pixel of a reference screen, from image information of the original screen and image information of the reference screen that is an original screen next to the original screen;

image shifting means for shifting by m/N of the motion vector a detection pixel of an m -th interpolation screen ($1 \leq m \leq N-1$) corresponding to the detection pixel of the original screen, and shifting by $-(N-m)/N$ of the motion vector a detection pixel of an $m+N$ interpolation screen corresponding to the detection pixel of the reference pixel;

compensation means for outputting, as the m -th interpolation screen motion-compensated, a resultant obtained by performing weighting by a value inversely proportional to a shift amount by the image shifting means and combining on pixel data of the detection pixel of the m -th interpolation screen and pixel data of the detection pixel of the $m+N$ -th interpolation screen shifted by the image shifting means.

14. A motion compensation method for performing motion compensation on an N -time-speed video signal subjected to N -time-speed conversion by inserting $N-1$ pieces of interpolation screens created from an original screen of a video signal between the original screen and a next original screen, the motion

compensation method comprising:

a motion vector detection step of detecting a motion vector between a detection pixel of the original screen and a detection pixel of a reference screen, from image information of the original screen and image information of the reference screen that is an original screen next to the original screen;

an image shifting step of shifting by m/N of the motion vector a detection pixel of an m -th interpolation screen ($1 \leq m \leq N-1$) corresponding to the detection pixel of the original screen, and shifting by $-(N-m)/N$ of the motion vector a detection pixel of an $m+N$ interpolation screen corresponding to the detection pixel of the reference pixel; and

a compensation step of outputting, as the m -th interpolation screen motion-compensated, a resultant obtained by performing weighting by a value inversely proportional to a shift amount in the image shifting step and combining on pixel data of the detection pixel of the m -th interpolation screen and pixel data of the detection pixel of the $m+N$ -th interpolation screen shifted in the image shifting step.

15. A motion compensation device for compensating movement of an image signal of new $N-1$ pieces of interpolation screens inserted between an original screen of a video signal and a next original screen, the motion compensation device comprising:

motion vector detection means for detecting a motion vector

between a detection pixel of the original screen and a detection pixel of a reference screen, from image information of the original screen and image information of the reference screen that is an original screen next to the original screen;

image shifting means for shifting a position of pixel data corresponding to the detection pixel of the original screen by m/N of the motion vector and shifting a position of pixel data corresponding to the detection pixel of the reference screen by $-(N-m)/N$ when an m -th ($1 \leq m \leq N-1$) interpolation screen is compensated; and

compensation means for compensating the image signal of the interpolation screens by performing prescribed weighting and combining on pixel data corresponding to the detection pixel of the original screen and pixel data corresponding to the detection pixel of the reference screen shifted by the image shifting means.

16. The motion compensation device according to claim 15, wherein

the compensation means performs the prescribed weighting and combining based on a shift amount of the position of the pixel data corresponding to the detection pixels of the original screen and the reference screen.

17. The motion compensation device according to claim 16, wherein

the compensation means performs weighting inversely proportional to a shift amount by the image shifting means, on pixel data corresponding to the detection pixels of the original screen and the reference screen.

18. The motion compensation device according to claim 16, wherein

the compensation means performs weighting by $(N-m)/N$ on pixel data corresponding to the detection pixel of the original screen and weighting by m/N on pixel data corresponding to the detection pixel of the reference screen.

19. A motion compensation method for compensating movement of an image signal of new $N-1$ pieces of interpolation screens inserted between an original screen of a video signal and a next original screen, the motion compensation method comprising:

a motion vector detection step of detecting a motion vector between a detection pixel of the original screen and a detection pixel of a reference screen, from image information of the original screen and image information of the reference screen that is an original screen next to the original screen;

an image shifting step of shifting a position of pixel data corresponding to the detection pixel of the original screen by m/N of the motion vector and shifting a position of pixel data corresponding to the detection pixel of the reference screen by -

$(N-m)/N$ when an m -th ($1 \leq m \leq N-1$) interpolation screen is compensated; and

a compensation step of compensating the image signal of the interpolation screens by performing prescribed weighting and combining on pixel data corresponding to the detection pixel of the original screen and pixel data corresponding to the detection pixel of the reference screen shifted in the image shifting step.